THE

YOUNG MECHANIC.

VOL. I. JULY, 1832. No. VII.

OBSERVATIONS ON DRAWING INSTRUMENTS.

[Continued from p. 82.]

THE DRAWING COMPASSES.

COMPASSES are made either of silver or brass, the points being always of steel. The joints should always be formed of different metals; thus one side or part should be of silver or brass, and the other of steel: the opposition in the texture and porous qualities of the two substances, causes the parts to adhere less together, to wear more equally, and to be uniform in their motions. The accuracy of the measurements is ascertained by the smoothness and equality of motion at the joints, for all shake and irregularity denotes an imperfect instrument. The points should be of steel, well hardened and tempered, else in taking measures from the scales they will soon become blunted or bent—not too fine and tapering, yet meeting very closely when the compasses are shut. They also should be well polished, whereby they may be preserved from rust a long time. As an instrument in *general* use, the compasses are so well known, that it would be superfluous to enumerate and explain their various uses. Suffice it to say, they are used to transfer measures of distances from one place to another, and to describe large and small arcs of circles. If the arc or circle is to be described obscurely, it should be done by the steel points; if it is to be in ink, crayon or black lead, the pen and pencil points are to be used.

To use the Compasses.—Beginners at first are apt to use a pair of compasses in a very awkward manner, whether in transferring distances or in describing circles; but practice will soon render them sufficiently familiar. With the thumb and middle finger pinch the compasses in the opposite hollows of the shanks, causing them to open a little: this being done, apply the third finger to the inside of the innermost leg, and with the nail of the middle finger acting against the farthest, open the compasses sufficiently to introduce the fingers between the legs. They may then be extended to any distance at pleasure, by moving the farther leg forward

and backwards with the middle and fore fingers. In this manner the compasses may be entirely managed with one hand, always observing never to work them with both hands at once, because they are apt in this way to indent or slip on the scales, thereby scratching and defacing the divisions. The compasses should always be held in an upright position, or inclined in a very small degree from one, and great care is necessary to hold them very lightly, merely allowing them to act by their own weight; and the legs had better be never so far extended as to make an angle with each other of more than 160°. In describing circles with the compasses, one foot must be set on the point designed as a centre, (being very careful not to press upon the paper with more weight than that of the compasses,) holding the head between the thumb and middle finger; then, rolling the compasses round, at the same time allowing the other point to rest upon the paper, the circle may be described with perfect ease, either in ink or pencil. The ink and pencil points have a joint in their tops, which fits into the compasses, and is confined by a screw, but the end of the shank of the best compasses is formed into a socket, which receives the pencil or pen point, and acting upon it with a strong spring prevents all shaking. This is found to be much better than the former method of a screw. Compasses are sometimes formed with the addition of a clamp and adjusting screw. This consists of a piece of steel which is formed to a screw at one end, the other having a slit or opening in it for the reception of the clamping screw, with a milled head, which screws into the leg of the compasses and binds the steel fast against it. A milled head nut plays upon the screw at the opposite end. This nut has a shoulder and a neck, or small part which is fitted and turns in a socket formed of a rectangular piece of brass, fastened to the other leg of the compasses by a round pin which passes through the leg, being secured on the opposite side by a nut or screw which prevents it from either drawing out or shaking, though allowing it at the same time to turn very freely. The utility of this contrivance is very great for measuring accurately, or dividing lines or circles into a great number of parts. By turning the nut, a very slow, delicate and progressive motion is given to the leg of the compasses. For ordinary purposes this apparatus may be removed altogether, but when extreme accuracy is required this becomes a very useful and beautiful instrument, and is decidedly the best which has been invented.

The Spring Dividers, are a small instrument for setting off a great number of small equal divisions, being not liable to alter while in use. They have no joint, but are composed of one solid piece of steel, and always tend to open by their own elasticity. They are closed and adjusted by a small screw, which passes through one leg and is tapped into the other. The tops of the legs are sometimes formed very similar to the top of the blades of the steel drawing pen, and screws into a brass cap.

There are likewise what are called *Hair Compasses*.—They consist of a pair of common dividers, the steel part of one of the legs

being secured to the shank by a long spring, which is confined at the end by a screw. This spring always has a tendency to throw the point inwards, and is counteracted by a screw with a milled head, passing through a hole in the end of the shank and tapped into the spring of the leg. To use these compasses, they must be held in the right hand, the screw being turned towards the left: by turning the screw with the thumb and fore finger, the spring point is brought nearer or farther from the other point. A great objection to these compasses is, that the leg, depending so much upon the stiffness of the spring to which it is attached, is apt to yield very materially, when pressed upon the paper, and serves better in theory than in practice.

The Bow Compasses, on account of their size, are used to draw very small arcs and circles, which can be done much more conveniently than by the large compasses, as from the peculiar shape of the head, it rolls with great ease between the fingers. Many improvements have been made in this little instrument as well as in the others, but the best, and probably the most convenient kind, have solid shanks, which meet at one end in a joint which is connected to a handle; the other end of the shanks having sockets into which the plain point and the ink and pencil points may be fitted and fastened by a screw. A duplicate leg is sometimes provided for this instrument, by which it may be converted into a *road pen*, which will draw double lines at any required distance asunder, and is much used for drawing roads on maps, plans, &c.

CHEMISTRY.

[Continued from page 21.]

CALORIC.

One of the most obvious and familiar effects of caloric is, that it has a tendency to expand all substances; i. e. heat any substance, and it is expanded, and occupies a larger space, cool it and it is contracted, and occupies a less *space*. There are one or two exceptions to this very general principle, which will be noticed hereafter.

9. We might take as a proposition, therefore, that all substances are expanded by being heated. We cannot, of course, illustrate this to the fullest extent, because, to do it, we should have to refer to the effects which caloric would produce upon all substances. We may select substances, therefore, from the three large classes of natural substances, i. e. solids, liquids and aeriform bodies, and show that these are expanded by being heated.

10. First, air is expanded by being heated.

Illustration. Apply anything that is hot to the bulb of the air thermometer (which has been explained.) It will drive the liquid down, showing that the warmth expands the air in it.

This principle is applicable to many of the common phenomena of nature. It is owing to this fact, probably, that we have any

motion of the atmosphere; i. e. the blowing of the wind, also the cause of the ascent of smoke, &c. up a chimney or stove pipe. For as the air is heated and expanded, it is measure for measure rendered lighter; so that the cold surrounding air presses it up.

When a fire is built, the air over it is heated—becomes lighter, and the cold air in the room presses it upward; *that* in its turn is also heated, and thus a continued current is kept up, carrying with it the smoke.

11. That liquids are expanded, may be seen by filling a bolthead or florence flask with water; having the water fill about one inch of the neck. Heat it, and the water will be expanded and rise in the neck.

Common thermometers are constructed on this principle, and as an application of the fact here illustrated, we may refer to the method of filling and graduating these instruments. A thermometer is a glass tube having a bulb blown on one end of it, the bulb and a portion of the neck being filled with some liquid. (See plate on p. 78.) The *caliber* of the tube being so small that they cannot be filled by turning the liquid through it into the large part, the following method is adopted for this purpose.

The thermometer is in the first place heated, and the air being thus expanded, much of it is driven out; while thus hot, the open end is placed in the liquid with which we wish it filled; (mercury is generally used,* but to illustrate the principle any colored liquid will answer.) As the thermometer cools, the air in it will be condensed, and the pressure of the surrounding air, on the surface of the liquid in the vessel in which the thermometer is placed, will force it up the tube, and nearly fill it.

When cold, remove it and again heat it in the same way, and by so doing two or three times, it may be obtained entirely full.

The whole of it is then exposed to as high a temperature as the thermometer is ever calculated to indicate when finished. The liquid will of course be expanded and rise in the tube; a mark is made on the glass where it stands. The glass is then melted a little above this mark, and moulded together while hot, so as to make it perfectly tight. This is called hermetically sealing it.

It is then graduated, so as to indicate temperature, by the following method.

The boiling, and freezing, of water, are assumed as starting points.

The thermometer is put in water, freezing cold. The liquid in it will be condensed and pass down the tube. Wherever the

* Although Mercury is generally used in the construction of thermometers, yet it cannot be used to denote temperatures ranging under 42 degrees below zero; for at that temperature, the mercury freezes into a solid mass. In the arctic regions, which Captain Parry visited in 1820, his thermometers, which were made of mercury, froze and became useless. But, by using those made of alcohol, he was enabled to describe with accuracy the intense cold which prevailed in that region. If alcohol freezes at any temperature, it is so many degrees below that of any other fluid known, that it is well adapted to the construction of thermometers which are required to indicate more intense cold than mercury will admit. EDS.

liquid stands make a mark, either on the glass, or the frame on which it is fastened. Then put it in water boiling hot; the liquid will be expanded, and ascend in the tube; wherever it stands make another mark. Then divide the space on the tube, between these two marks, into an equal number of degrees, and extend degrees, of the same length, above and below these marks: and we shall at once perceive, that these will be the properties of this instrument. Whenever it is exposed to a temperature, just as cold as at which water will freeze, the liquid in it will be just as much condensed, as it was when put in the freezing water in the first place; and whenever exposed to a temperature, just as high as at which water will boil, it will be just as much expanded, and the liquid in the tube will stand at the same place; and so on with any intermediate temperature, above or below these marks.

12. That solids are expanded, by being heated, may be seen, by taking the measure of a metallic rod when cold, heat it and we shall find it longer.

Illustration ii. This fact is illustrated more plainly, by using a pyrometer; which is a machine so constructed, by means of a multiplying power, that a slight expansion of a bar of metal, or any other substance, may be seen on a large scale.

Place a rod in the pyrometer, and apply heat to it; it will cause the index to move over a large surface.

It is owing to this principle, that it is so extremely difficult to obtain clocks and watches that shall keep correct time; for when heated the different parts are expanded, and move slower—will lose time: when colder will be contracted—move quicker, and of course gain time.

13. Caloric tends to an equilibrium, i. e passes from one body if hot, to all other bodies in the vicinity, till they are of the same temperature.

We may see this in part illustrated, by putting the hand upon the bulb of the air thermometer. At first the liquid will descend, but soon become stationary. The hand being warmer than the air within the thermometer, caloric passes from the hand to the air, warms and expands it, until that becomes of the same temperature. All bodies similarly situated for any considerable length of time, will be of the same temperature.

14. Bodies have the property of conducting caloric, or allowing it to pass through their substance. Different substances possess this property, however, in very different degrees.

Illustration. This may be illustrated by taking small cones of different substances, a few inches long, and putting a little wax or phosphorus on the apex, set them on a heated metallic plate. The wax will be melted, or the phosphorus inflamed, from some much quicker than from others. It may also be illustrated, by the conductometer, which is a small tin vessel, about two inches in height, having a number of tubes in the top of it. Fill this with hot water, and place in these tubes rods of different metals, glass, pipe-clay, wood, &c. having the wax or phosphorus on the upper

end as before. The difference in time, in which they will be effected, will show the different conducting powers of the substances.

All metallic substances are good conductors, though some are better than others. Silver, gold, and copper, are better conductors than platinum, iron, and lead. Wood, charcoal, wool, silk, feathers, down, fur, &c. are poor conductors. This principle has a wide application in domestic economy.

15. Caloric is reflected from hard polished surfaces like light.

Illustration. This may best be illustrated, by using two concave mirrors, of planished tin or plated copper, placed at the distance of about eight feet. Under these circumstances, when a thermometer is in the focus of one of the mirrors, it will be found to be effected by a heated body placed in the focus of the other: and that it is produced by reflection, and not radiation, may be shown by moving the thermometer out of the focus, towards the heated body, or by hanging a small screen between the thermometer and heated substance; in neither of which cases will the thermometer be effected.

Having a ball two inches in diameter, heated red hot, in the focus of one, place a lamp so that the wick shall be in the focus of the other. A small piece of phosphorus, placed in the wick, will be inflamed and light the lamp.

16. When liquids are changed into aeriform bodies, they are immensely expanded.

Illustration. This may be illustrated in a very amusing way, by using an *eolipile*, which is a globular piece of metal or glass, having a long slim neck. It may be used by the following method. First heat it and expand the air: then hold the stem in cold ether or alcohol: as the air is condensed the liquid will be forced into it. Then hold the ball over a lamp and cause the liquid to boil: as it is changed from the liquid to the aeriform state, it will be expanded and forced through the tube with great velocity; which may be seen by applying a blaze to the vapor; it will burn brilliantly. By causing it to boil rapidly, a stream of blaze many feet long will be produced.

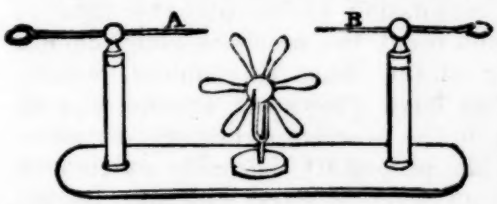
MECHANICAL EFFECT OF ELECTRICITY.

The mechanical effects of electricity are exhibited in its power of impelling and dispersing light bodies; of perforating, expanding, compressing, tearing, and breaking to pieces, all conducting substances through which it is sufficiently powerful to force its passage.

If a light wheel, having its vanes made of card paper, be made to turn freely upon a centre, it will be put in motion when it is presented to an electrified point. The wheel will always move from the electrified point, whether its electricity is positive or negative. In this experiment the current seems to be produced by the recession of the similarly electrified air in contact with the

point, and therefore the circumstance of the wheel turning in the same direction when the electricity is negative, cannot, as Mr. Singer has remarked, be considered as any proof of the existence of a double current of the electric fluid. As an illustration take the following experiment:

Place upon an insulating stem a light wheel of card paper, properly suspended upon pivots, as represented in our plate, and introduce it between the pointed wires (AB) of the universal discharger, placed exactly opposite to each other, and at the distance of little more than an inch from the upper vanes. Then having connected the wire A with the positive conductor, and the wire B with the negative conductor, of an electrical machine, the little wheel will revolve in the direction A B; and if the wire B is connected with the positive end, and A with the negative end, the motion of the wheel will be from B to A. The transmission of a small charge through the wires, by an insulated jar, will produce the same effect.



The preceding experiment, imagined by Mr. Singer, is considered by him as a proof that there is only one electric fluid, and that it passes from the positive to the negative wire; for, if there were two electric fluids he concludes 'that the wheel being equally acted upon by each, will obey neither, and remain stationary.'

ON CURING DAMP WALLS.

MESSRS. EDITORS—I have often looked with pleasure at the beautiful statue of Washington, which has excited considerable interest in our community, and is deservedly considered as an elegant specimen of the fine arts, as well as a tribute of gratitude to this father of our country. But, whatever feelings of respect and enthusiasm would arise while looking at the noble form before us, we cannot fail of having those feelings checked, by the disagreeable appearance around it.

I would not have it thought, that the fault is in the form of building, or any thing connected with the architectural department, as these appear both appropriate and in good taste. But the cause of complaint is, the painted walls upon the inside. These having been painted while the plaster was in a damp state, the lime acted upon the paint, and changed the color in spots. This not being the only case where I have observed this difficulty, I am induced to invite the attention of mechanics to this subject, for the benefit of those who, by closing a window, or making other alterations in a room, are subjected to a similar inconvenience, either from the dampness preventing the paper from sticking, or discoloring the paint.

Two methods practiced in England, and published in the London Mechanics Magazine, I think can be criticised with propriety.

The first of these is, covering the walls with thin sheet lead which is prepared for the purpose, and fastened with small copper nails. This method might possibly answer for a private dwelling, but it is well known, that for a public building like the State House, it would be an actual temptation to destroy the face of the wall entirely. I hardly need recal the minds of your readers to that peculiar characteristic of the New Englanders, which, amidst all the improvements that have grown up around it, still retains its existence. I allude to the practice of cutting, scratching, &c. in public places. This propensity is really carried to such an extent, that if a foreigner, unacquainted with our habits, *had* seen the carving of the wood work of the State House cupola, and was *now* to see the figures, letters, and names, cut on the copper (with which the state was obliged to sheath the inside, to prevent its being cut entirely away,) he must certainly be convinced, that the Yankees ought to be celebrated, for being such adepts in the *classical arts* of *engraving* and *sculptor*. Considering the method of leading in this light, as applied to the building in question, I feel assured, that the majority will agree with me in deciding, that it would be entirely useless.

The second method is, to wash the walls with water slightly impregnated with sulphuric acid, which I should think to be liable to more than one objection. The object of this wash is to neutralize the alkaline or caustic qualities of the lime, to prevent its acting on the oil in the paint, and producing the effect complained of. The important objections which I conceive against this method are, first, the alkaline, or principal property of the lime being destroyed, it would have a tendency to leave the walls in a crumbling and weak state. Secondly, however smooth the walls might be after having been plastered, the acid, acting upon the lime, and not the sand which is mixed with it, would leave the surface in a very uneven and rough condition, and thus remedy one evil and produce a greater. My object in this communication is, to learn if there is any simple but effectual method for preparing walls such as I have mentioned, for painting or papering.

J. M. W.

METALLIC CASTS FROM ENGRAVINGS ON COPPER.

A most important discovery has lately been made, which promises to be of considerable utility in the fine arts : some very beautiful specimens of metallic plates, of a peculiar composition, have lately appeared, under the name of " cast engravings." This invention consists in taking moulds from every kind of engravings, withline, mezzotinto, or aquatinta, and pouring on this mould an alloy, in a state of fusion, capable of taking the finest impression. The obvious utility of this invention, as applicable to engravings

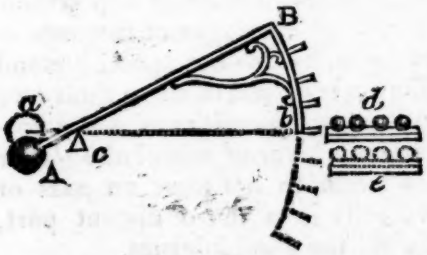
which meet with a ready sale, and of which great numbers are required, will be incalculable; as it will wholly prevent the expense of retracing, which forms so prominent a charge in all works of an extended sale. No sooner is one cast worn out, than another may be immediately procured from the original plate, so that every impression will be a proof. Thus, the works of our most celebrated artists may be handed down, *ad infinitum*, for the improvement and delight of future ages, and will afford at the same time, the greatest satisfaction to every lover of the fine arts.

Operative Mechanic.

SIMPLE MACHINES.

The following extract is from Arnott's Natural Philosophy. We would recommend to Mechanics an attentive perusal of the illustrations and conclusions drawn from it, and assure them that they cannot be too well grounded in first principles.—EDS.

ANOTHER case of the lever, exhibited in the adjoining diagram, serves well to explain the nature of *mechanical powers* in general. Suppose A to be a weight of four pounds at the end of the rod of lever A B, turning on C as an axis or fulcrum, and having the arm C B four times as long as the arm C A: one pound at the end B, would balance the four pounds at the end A, and the slightest additional weight would cause it to preponderate. Now let us suppose the arc B *b* fixed to the long arm of the lever, and having four projections or shelves from it, on which balls of one pound might rest: if one of the four balls from the plane *d* were to roll upon the first shelf, with one grain more, it would lift A, and would itself descend to the plane *e*, one inch below;* then a second ball of one pound would occupy the second shelf, and would descend in the same way, and then a third, and then the fourth; and when the whole had fallen from *d* to *e*, they would just have lifted the four pounds weight, at the other end of the lever, one inch. Then, although one pound were seen here lifting four pounds, it would only have lifted it one-fourth part as far as it fell itself, and the sum of the phenomena when ended would be, that four pounds, by falling one inch at the long end of the lever, would have lifted four pounds one inch at the short end. No *mechanical power* or *machine* generates force more than the lever in this case.



It appears, then, from all this, that as the *quantity of motion* in a

* The ball must be supposed here to roll off.

body is measured by its velocity, and the number of atoms in it conjointly, so the *quantity of force* exerted in any case, is measured by the *intensity* of the force conjointly with the *space* through which it moves; and therefore a clear mode of speaking of forces in comparing them is to state the *length* and the *intensities*—for instance, to speak of ten feet of one pound force, or of one foot of ten pound force.

A horse pulling with a force of fifty pounds goes generally at the rate of six miles an hour:—the steam engine piston generally moves at the rate of two hundred feet per minute, and has a pressure of steam of about twenty pounds to each square inch of its surface:—a certain mill-stream may have a force of one hundred pounds, and a velocity of a hundred and fifty feet per minute. Now it is easy, by simple arithmetic, and the rule of *length* and *intensity* above explained, to compare all these and other forces as applicable to any work. We must warn the reader, however, that there are many important considerations connected with the practical employment of forces, according to their respective nature, and that of the resistance to be overcome, which cannot be entered upon in this elementary work. In very many cases there is a great waste or unavoidable loss of force, because the resistance in yielding, runs away or escapes from the force, as when a ship runs away from the wind which is driving her, or the floats of a quick moving water-wheel from the stream which turns it. Horses drawing boats or carriages at the rate of five miles an hour, may exert great force, but with a speed beyond twelve miles, nearly their whole effort is required to move their own bodies. As a general rule, although *equal quantities* of force balance each other when applied to parts of a lever or wheel altogether or nearly at rest, still when force is made to act near an axis or fulcrum, to produce considerable velocity in a more distant part, much of it is wasted in pressure against the fixed fulcrum.

What an infinity of vain schemes—some of them displaying great ingenuity—for perpetual motions, and new mechanical engines of power, &c. would have been checked at once, had the great truth been generally understood, that no form or combination of machinery ever did or ever can increase, in the slightest degree, the quantity of power applied. Ignorance of this is the hinge on which most of the dreams of mechanical projectors have turned. No year passes, even now, in which many patents are not taken out for such supposed discoveries; and the deluded individuals, after selling perhaps even their household goods to obtain the means of securing the supposed advantages, often sink in despair, when their attempts, instead of bringing riches and happiness to their families, end in disappointment and utter ruin. The frequency and eagerness and obstinacy with which even talented individuals, owing to their imperfect knowledge of this part of natural philosophy, have engaged in such undertakings, is a remarkable phenomenon in human nature. Examples of such schemes will be noticed in different parts of this work, where they may serve to illustrate points under consideration.

BENJAMIN HENRY LA TROBE.

It is with real regret we announce the death of a very amiable man and skilful artist, a native of this country, (Eng.) who has successfully exemplified his talents as an architect and engineer in the United States of America ; and whose reputation has deservedly obtained an elevated rank abroad, and a corresponding respect at home.

The New Orleans papers to the 4th of September, describe the ravages of the disease by which that city is afflicted as being awful and increasing, and announce, that among the victims to its violence is B. H. La Trobe, the distinguished artist, who is well known from his works by nearly all the Atlantic states ; he died on the 3d of September 1820. Two or three years ago, his eldest son fell a victim to the climate of the same place. In 1795, Mr. La Trobe, at the age of 33, visited America with the purpose of proceeding to Philadelphia, and to the seat of his maternal uncle, Colonel Antes, on the Susquehanna ; but from severe stress of weather, in which the ship was in much danger for ten weeks, it ran into Norfolk, in Virginia. Here, unknown to every one, he accidentally accosted a gentleman who proved to be a commissioner of the customs, and who, interested by his amiable manners, invited him to his house, and shortly introduced him to Col. Bushrod Washington. This gentleman, interested by the superior accomplishments of the young stranger, took a speedy opportunity to present him to his relation, the President, with whom he remained some days at Mount Vernon, and was encouraged to enter upon his profession as Architect and Engineer.

In this little history of events, how much is obviously the work of a kind Providence, who, from the very elements of human anxiety, disappointment and danger, causes the fulfilment of our most arduous enterprises, and, as it were, in a moment, effects events, whose distance is beyond the command of men, even by the exercise of the greatest skill and most laborious exertions.

Mr. La Trobe was early consulted on the practicability of making James River navigable, which he accomplished, and was appointed Engineer to the state of Virginia. He resided some time in Richmond, and a few years at Philadelphia. He executed important works for supplying the city with water, and built the Bank. He also repaired and improved the works of defence and the light houses on the coast, and thus obtained the appointment of Engineer to the city of Philadelphia.

About this time, being a widower, he married an amiable and accomplished lady, the daughter of Isaac Harkhurt, Esq.

On being appointed surveyor of the public works to the United States, he removed to Washington ; and there executed some of his principal undertakings, among which is the Hall of Representatives. It is a circumstance worthy of remark, that but one month prior to the time of his decease, Mr. La Trobe addressed a letter to Mr.

Ackerman in which he enumerates some of his chief works, and consults him on the publication of his designs, copies of which he intended to transmit to London for the purpose. He mentions the following :

The Cathredral of Baltimore, a building of Granite, vaulted throughout, and the largest church in North America ; the dome 70 feet internal diameter, and 100 feet internal height. the Exchange of Baltimore, 256 by 140 feet, as his boldest work—the dome 115 feet high. The Hall of Representatives at Washington, a room 100 feet long by 80 feet wide, 50 feet high, and embellished by twenty-four highly sculptured Corinthian columns, 28 feet high, and with a suitable entablature, all of stone, and the whole vaulted in that material and brick.

The Bank of Pennsylvania, a building entirely of white marble, some of the covering blocks of which are 25 feet long, 5 feet wide, and 1 foot thick. This he considers his best work.

The Engine House of Philadelphia, in the centre of the principal square, for the supply of water to that city he states, is of marble, and decorated with columns 16 feet high, in single blocks.

The north wing of the Capitol of the United States he maintains as having been begun when he became surveyor of the public works ; and that he succeeded a French Architect, and our intelligent countryman, Mr. Hatfield, the architect, in building. As part of this edifice was of a temporary nature, he reformed the interior and simplified the exterior, designed the centre, and erected the south wing in correspondence with the north. The interior, however, he regrets as not being to his mind, and concludes by stating *la difficulto varnuce* is yet too conspicuous in its arrangements. Mr. La Trobe adds, that the Bank of the United States, now building by one of his pupils, Mr. Strickland, is his design, but that the principal room is a deviation from it.

Mr. La Trobe's occupation towards the close of his life, became of a very anxious nature ; and, as a portion of his letter to Mr. Ackerman not only explains it, but supplies a just encomium on his eldest son, whose death was noticed in the commencement of this narrative, we shall take leave to extract it.

'In the year 1811, I sent my eldest son, then only 17 years old, to New Orleans to attend to the execution of the works necessary to supply the city with water, for which object I had obtained an exclusive privilege. I was surveyor of all the public buildings of the United States, an office of great trust. My son, with uncommon talents, and particularly for the object of my own profession, with the assistance of good mechanics, was able to attend to this great work. The war and a variety of other causes delayed the execution of the work, and in 1817 I had the irreparable misfortune to lose him, leaving the concern and $50,000 involved in it, in the most precarious state. It was therefore necessary for me either to submit to a total loss of so large a property, or prepare to come to New Orleans. I resigned therefore my public office, and in 1818 came hither ; and on April 20th, brought my whole family, where we shall probably reside for a year or two.'

On the 4th, of August, Mr. La Trobe wrote the preceding letter, and on the 3d of September following he was no more.

As the biography of men of genius is at all times interesting, we add some facts relative to the early years of our much lamented friend.

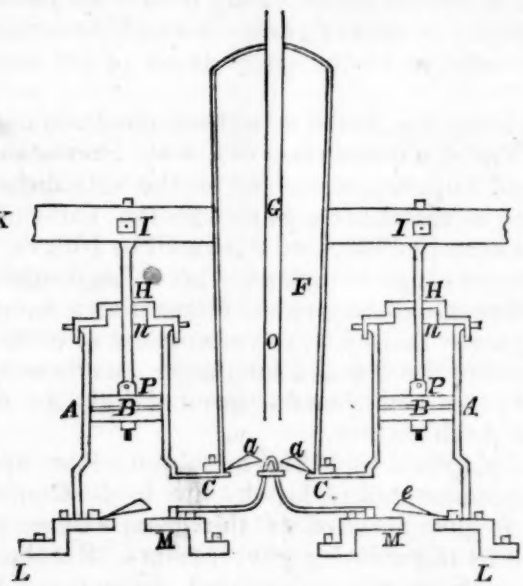
Benjamin Henry La Trobe was the second son of the late Rev. Benjamin La Trobe, a descendant of a noble Protestant family from Languedoc, and Superintendent of all the establishments in England belonging to the church, known by the name of *Unitas Fratum*. He was born in 1762, and educated at Fulnee, near Leeds, and at fifteen years of age commenced his college studies, at Nisky, in Saxony, where he distinguished himself as a scholar of much genius, having every facility for the attainment of all kinds of useful knowledge, besides the learned languages, mathematics, and philosophy. Here he manifested a great delight for drawing, and particularly for Architecture.

Returning to England in 1785, he obtained an appointment in the stamp office, presented to him by the lords Commissioners of the Treasury, in consideration of the great esteem in which his father was held by the existing governments. But the employment not suiting his feelings and active mind, he entered the office of an eminent Architect in the city, and afterwards that of another professional gentleman, with whom however he remained but a short time.

While pursuing his studies at home, he was visited by a friend, Mr. Sperling, who, finding him disengaged, and admiring his growing talents, commissioned him to design and build for him a mansion near Grinstead, to be called Hammerwood Lodge. It is now in the possession of Dorrian Magens, Esq.

This building obtained for him the further patronage of Mr. Trayton Fuller, for whom he designed a house at Ashdown Park; and being further established in his profession, he about this time married the daughter of the late Rev. Mr. Lellon, rector of St. James Clerkenwell, with whom he lived in the enjoyment of true domestic felicity. She brought him a son and daughter; but the birth of a third child proved fatal to the mother, and this sudden bereavement threw Mr. La Trobe into a nervous disorder that led to much derangement of his affairs, which, having reinstated, he formed the resolution of quiting England for America, with the intention of visiting his uncle and establishing himself in that country.

[We are indebted to a friend for the preceding article, copied from Ackerman's Repository for January 1, 1831.]



FIRE ENGINES.

Messrs. Editors—In a former number of your Magazine, is an interesting article on Fire Engines, at the head of which, is a perspective view of one on Newsham's principle, and no doubt was recognized as one of the favorites of this city. The writer of this article very justly observes, that although there are many different forms and arrangements of the working parts, yet they all act on the same general principles—the compression of air, to produce a continued stream. It is well known, that many important improvements have been made in the form and structure of this most useful machine, and that the grand desideratum to be gained, is, the forcing the largest quantity of water to the greatest distance, with the least exertion. To accomplish this, Mr. Newsham placed his pumps parallel to the ends, while others arranged them parallel to the sides. The drawing above is intended to represent a section of one of this kind, and will be understood by the following description and letters of reference in the cut.

'A A are the chambers or pumps, which are made of brass. The part in which the piston works is bored and polished; they are bolted down upon the seats M, which are in like manner secured to the bottom of the engine by bolts through the feet L. The pistons B B are two metal disks, each enclosed in leather, pressed into the form of a cup; the bottom of these cups come in contact with each other, and the disks, and leathers, are firmly connected by the piston rods *n n*. The centre of the levers being permanent, these rods are made to work on a moveable pin P, and passing through the guide H, are alternately raised and depressed by the

motion of the lever K, (a portion of which is represented,) moving upon its centre G. When the piston is raised the chamber fills with water, which is forced into it by the pressure of the atmosphere on the surface, through the opening in the seat M. It is then depressed, the valve *e* closes, and the water passes up through the waterway *c* into the air-vessel F, and is there retained by the closing of the valve, or until by the frequent and alternate operation of the pistons, the air in the air vessel is so far condensed, that by its reaction it forces the water through the pipe o, on any object towards which it may be directed.'

This engine is of the form preferred and adopted by most of the firemen of Philadelphia, and one of which, No. 18, belongs to our present fire department, so that any who are skeptical in regard to the merits of the Philadelphian, can easily satisfy their doubts at the next fire. The chambers, air vessel, &c., are the same as Newsham's, and the only difference is, that the situation of the chambers is such, that the piston rods are attached direct to the levers, or breaks, and prevents the necessity of using chains, and sectors; and if it operates as well, it must be decidedly superior—for simplicity is the soul of improvement. J. M. W.

MINIATURE STEAMER.

A Miniature Steamer owned by Messrs. E. and G. L. Hanks, —the engine of which was constructed by the last named gentleman—has excited the attention of many of our citizens. She is only about eighteen feet in length, 'from stem to stern,' and has but five feet beam. She is a most beautiful model—perfect as to exact keeping and proportion—and when 'the fit is on her,' she moves about the noble Connecticut, with three or four passengers, with all the grace of Steamers large enough to receive her into their boilers. She has voyaged as far as Wethersfield—and after having gone to Springfield, 'the proprietors and owners' intend to visit New York in her—taking care to 'hug the shore.' Mr. G. L. Hanks, is the young gentleman, whose 'miniature engine'—now in Washington College—we noticed favorably, many months since.—*Connecticut Mirror.*

ANSWER.

Messrs. Editors—A correspondent in the fourth number of the Young Mechanic inquires why the atmosphere is never dark on a windy night. The following ideas upon the subject I, will offer, as they may assist him in solving the mystery. It is well known that clouds are formed of water, which rises from the earth in the form of vapor, or steam; this, at a certain degree of heat, is more opaque, or cloudy, than at any other. This can be proved by the steam issuing from the spout of a tea-kettle when boiling. By examination, it will be found that near the hole from which it issues, the steam is quite transparent, and likewise

at about a foot distant, while in the space between it is very opaque, and objects can scarcely be distinguished through it. From this, I would infer a reason for the atmosphere being brighter on a windy night;—for with an increase of wind, there is a change in the temperature of the air, which, if colder, condenses the vapor, and the particles occupying less space, the light is not so much obstructed, and it follows of course that the atmosphere will be brighter. It may also be assisted considerably by the velocity of the winds, separating the particles still farther from each other, than by being simply condensed. In regard to the condensation of the vapor by the wind, my ideas were strengthened by observing, that on the increase of wind on a cloudy night, small quantities of rain fell during the evening, which I supposed might be attributed to the vapor being rapidly condensed by the change in the air, and uniting in drops, fell in the form of rain.

I have thus given a few ideas upon this phenomenon, and I hope some of your correspondents will give it some attention. It is, in fact, a subject upon which much might be said, and good arguments be used, although it is apparently extremely 'light and airy.' J. M. W.

QUESTIONS.

To find that number, which being doubled, and 16 substracted from the product, the remainder shall as much exceed 100 as the required number itself is less than 100.

Messrs. Editors.—It will oblige me, if some of your correspondents will answer the following question.

How much *horse power* is a steam engine of the following dimensions equal to?

Pressure of steam to the square inch, 75 lbs.
Area of piston 28 square inches.
Length of stroke 22 inches.
Double strokes per minute, 75.

Messrs. Editors—Will you oblige a correspondent, by inquiring through your Magazine the cause of the following accident? A decanter was placed on the shelf of a bar room in this vicinity, when suddenly the glass stopple broke into a number of pieces without injuring the decanter or the witnesses being able to account for it. J.